# Effects of Defensive Vehicle Handling Training on Novice Driver Safety: A Case Study in Lewistown, Montana

## Phase 3: Analysis of Safety Data

by

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A proposal prepared for the

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# PROBLEM STATEMENT

New teenaged drivers have the highest accident rates of any group of drivers. Research shows that drivers under the age of 19 have a crash rate that is four times that of the general driving population and the youngest drivers have a higher accident rate yet. The highest accident rate is experienced within 2 years of receiving the driving license. Obviously, the crash rate decreases with driving experience. Research is needed to determine how to safely equip novice drivers with the important elements of experience before they encounter a need for it in an actual driving situation. Many novice drivers' accidents involve improper reactions to skids, panic stops, run-off-pavement, and other unusual situations unfamiliar to the young driver.

Several organizations in the United States offer training in advanced vehicle handling for novice drivers. Such training typically includes vehicle control on skid pads, obstacle avoidance, rapid deceleration braking, and maneuvering near the vehicle performance limits. While there is considerable anecdotal evidence that such training, added to the standard driver instruction, creates a more capable novice driver, only one systematic study of its effect on the safety of young drivers has been completed. A study of over 400 graduates of an urban, east coast course, reported that the graduates had 77% fewer accidents than their peers. That number, however, was probably inflated by a weak research design in which the more careful and highly motivated teens were self-selected into the training classes.

A much more carefully designed and controlled study is needed to validate those results. The needed study would compare demographically equivalent groups of young drivers that were comparable in driving ability and safety motivation.

The Western Transportation Institute is conducting a controlled study designed to do this. In the initial phase, accident records for young Montana drivers were analyzed and a defensive driving curriculum was designed to address the most common risks. WTI and the Montana Office of Public Instruction recruited approximately 400 young drivers in central Montana to take part in the study. Half received a one day intervention of advanced defensive driving during the summer of 2005.

*This proposal is for the third phase of the project, the longitudinal collection and analysis of accident and violation data.*

# BACKGROUND SUMMARY

## The Safety Statistics

Each year, roadway accidents take the lives of approximately 40,000 people and seriously injure approximately 3 million in the United States (U. S. Department of Transportation, 2005). The costs of these accidents approach $200 billion.

Young teenaged drivers have a considerably higher accident rate than any other age group. New teenaged drivers have the highest accident rates of any group of drivers. Figure 1 shows that drivers under the age of 20 have a crash rate four times that of the general driving population (Williams, 2003). The highest accident rate is experienced within 2 years of receiving the driving license. Obviously, the crash rate decreases with driving experience and increased maturity. Research is needed to determine how to safely equip novice drivers with the important elements of experience before they encounter a need for it in an actual driving situation. Many novice drivers' accidents involve improper reactions to skids, panic stops, run-off-pavement, and other unusual situations unfamiliar to the young driver. Other of the accidents can partially be attributed to lifestyle issues such as risk-taking, risk-seeking, peer pressure and approval, and substance abuse.

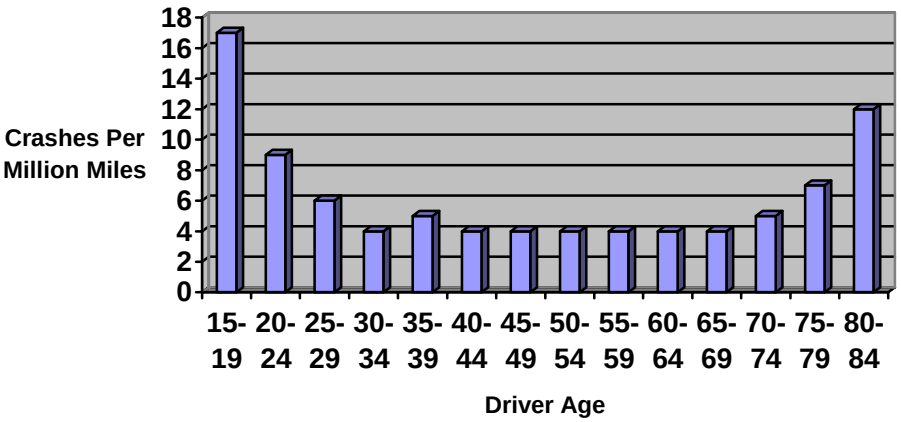


**Figure 1: Accident rate by driver's age**

Driver education in European countries is also much more rigorous than that in the United States. Classroom training is presented on vehicle operating principles and basic maintenance. Typically, behind-the-wheel training provides much more emphasis on the more advanced aspects of vehicle handling in potentially hazardous conditions. Also, the minimum age for driver licensing is usually higher than the ages mandated by the States in the U.S.

Several organizations in the United States offer training in advanced vehicle handling for novice drivers (Car Control, n.d. a). Such training is intended to supplement basic driving classes and typically includes vehicle control on skid pads, obstacle avoidance, rapid deceleration braking, and maneuvering near the vehicle performance limits. While there is considerable anecdotal evidence that such training, added to the standard driver instruction, creates a more skilled and

capable novice driver few systematic studies of its effect on the safety of young drivers have been completed. Where such studies have been done, results are contradictory and subject to interpretation and controversy.

**Research on Driver Training**

A large percentage of young drivers receive their driving training in school-based classes. These classes require numerous hours (typically 30) of classroom instruction on rules of the road, vehicle operation, and safety. The nascent drivers then spend several hours (typically 6) behind the steering wheel driving in parking lots or in normal traffic on familiar streets. Only rarely do they experience circumstances in which the vehicle must be handled at its performance limits. Most carefully controlled research has found that standard driver education classes have little impact on subsequent driving safety (e.g., Stock, et al., 1983).

Many questions have been raised concerning the effectiveness of conventional young driver's education programs. Some advocates declare young driver's education programs as successful while other experts see problems with such programs. A former researcher at the Insurance Institute for Highway Safety, Williams (2003) declared these short-term programs as unrealistic approaches to increasing the safety of young drivers. On the contrary, a recent study conducted by the Oregon Department of Transportation (ODOT) and the Center for Applied Research found "significantly lower rates of convictions, suspensions and crashes" for those taking the driver education course versus those who learned through 50 hours of informal, supervised training (Triplett, 2005).

International literature demonstrates little proof that formal driver instruction increases driver safety, yet arguably these programs have failed to adequately address age and experience related factors that contribute to young driver's increased risk of accidents. It is believed that such programs can be more effective if they are more empirically based, addressing the age and experience related factors (Mayhew and Simpson, 2002). Mayhew and Simpson state the reasons why formal instruction fails to reduce crashes:

- Driver education/training fails to teach the knowledge and skills critical for safe driving,
- Driver education does teach safety skills but students are not motivated to use them,
- Driver education fosters overconfidence,
- Driver education fails to adequately address lifestyle issues,
- Driver education fails to tailor content to student needs.

The well-known Dekalb driver education study, conducted in suburban Atlanta, was one of the first attempts to systematically validate the benefits of driver education (Stock, et al., 1983). A cohort of 16,000 high school students was examined. The participants were divided into three groups receiving no training at all, a minimal curriculum of 20 hours of training, or a Safe Performance Curriculum (SPC) of 70 hours of training. The SPC curriculum was based on a task analysis of required driver skills but little information survives about how it was conducted. The methodology has generated considerable subsequent debate, especially concerning the equivalency of the three groups, but the bottom line finding was that there was no significant

difference between the training groups in driving safety after the first six months after completion. One observation was that drivers in the "no training" group delayed obtaining their driver's licenses as compared to drivers in the other groups.

Mayhew and Simpson (2002) completed a synthesis of research related to safety benefits of young driver training. They concluded that the major effect of traditional, school-affiliated driver education programs is to make licensing more readily available to younger drivers. They found no clear evidence that these traditional programs have a positive impact on safe driving. The authors recommended a multistage training approach in which the traditional training is later supplemented by a carefully designed advanced training program that:

- Is focused on psychomotor, cognitive, and perceptual skills shown to be associated with high collision rates among young drivers,
- Includes experiences demonstrating the value of safe driving practices,
- Incorporates experiences that make the drivers more aware of their own limitations,
- Uses techniques developed to address lifestyle and risk-taking behaviors, and
- Recognizes that there are individual differences in skill levels and addresses specific skill deficiencies of the individual participants.

Such an approach is advocated by the American Driver and Traffic Safety Education Association as part of a graduated licensing system in which, "Initial training of novice drivers will provide basic vehicle handling skills and the second training course will provide other safe driving skills, including enhanced decision making to reduce the risk of young drivers (Robinson, 2001)."

A study of over 400 graduates of an urban, east coast course for young, previously licensed drivers reported that the graduates had 77% fewer accidents than their peers (Car Control, n.d. b). That number, however, was probably inflated by a weak research design in which the more careful and highly motivated teens were self-selected into the training classes. A much more carefully designed and controlled study was needed to validate those striking results.

Skill-based training has created much discussion among driver education experts. Research has shown that skill based strategies may produce overconfidence of one’s own skills (Gregersen 1996a). For example, Glad (1988) found that those partaking in skid training, as mandatory part of the training, had an increase in slippery road accidents. Another study found that after the introduction of skid training into the education curriculum higher rates of accidents occurred in slippery road conditions (Keskinene et al., 1992). It is believed that many skid training courses were based on maneuvering skills, leading to overconfidence. To counter this effect it has been suggested that a distinction be made between training of skills and training of risk-awareness. Skill-based training concerns understanding vehicle control and maneuvering while risk-awareness is designed to increase knowledge, experience and recognition of dangers (Gregersen, 1996b; Advanced, 2003). A recent study on the effectiveness of skid-car training for teenage novice drivers in Oregon found that females who received skid-car training had no change in crash rates, while the males appeared to have higher rates in the two years after training. However it did appear that those receiving the training had relatively fewer slick surface and rear-end collisions (Jones, 1995).

The EU project Advanced (2003) developed several recommendations for post license driver training. These recommendations were not objectively based but were based on the consensus of the researchers and investigators working in the area. The general recommendations include:

- Courses should focus on the specific needs of the participant and encourage them to improve their driving style and behavior,
- Track based driver courses should focus more on risk awareness than on maneuvering skills,
- Comprehensive feedback and discussion sessions should be conducted after each on-road exercise,
- To maintain individual attention group size should not exceed 10 participants per instructor during track-based courses,
- Training must be relevant to real-life situations, exercises and discussion should be related to real life scenarios,
- Overconfidence should be avoided, this is done by allowing students to fail (i.e. hit obstacles, lose full or temporary control of the vehicle),
- Good client-trainer relations should be established to have the greatest influence on the participant throughout the course.

Graduated licensing programs have been shown to significantly reduce young driver accidents and fatalities (McKnight and Peck, 2002). While these programs don't necessarily improve the skills of young drivers, they do reduce their miles of driving and their exposure to peer pressure and hazardous driving conditions during their early driving years (Fohr, et al., 2005). During the 2005 legislative session, a form of graduated licensing was instituted for Montana. Since implementation begins in 2006, it is too early to determine whether the expected benefits will materialize.

The research proposed in this program will compare two matched groups of novice drivers. Approximately four hundred teens enrolled in driver education were solicited to participate in a teen driver research project. Half of the participants received an intervention approximately 6 months after they take driver education that involved a one-day classroom and behind-the-wheel workshop. The workshop will include a pre-assessment of skills based upon Mottola's 10 driving habits, training on the habits and a post-assessment at the end of the day. Most of the day was involved in training students in the key habits that address the greatest number of driving crashes teens in Montana experience. A tailored communication at the end of the training outlined the key issues each individual student needs to continue to work on with suggestions to parents on how to help the student. Teens will be tracked for 4 years following the project to determine the driving history comparisons of the control group to those who received the intervention. Reported accidents, violations, and driving experience will be compared.

# RESEARCH PLAN

## Overview

Approximately 400 high school students between the ages of 14 and 16 who have enrolled in driver education classes in central Montana high schools were recruited. They were divided into two groups matched for age, gender, prior driving experience, and other pertinent factors. One group was assigned to "Standard Training" and the other to "Advanced Training." Both groups began with the standard high school driver education class. Six to twelve months after completing their standard classes, the students in the advanced training group were presented with the advanced defensive handling class.

This training used the Montana Department of Transportation's defensive driving training facility in Lewistown, Montana. The facility, operated by the Office of Public Instruction, is used to provide advanced handling classroom and in-vehicle instruction to police and emergency response drivers. It is located on underused airport runways and taxiways and includes classrooms, skid pads, obstacle avoidance and high speed maneuvering courses. A specially developed curriculum was prepared and presented by the Montana Office of Public Instruction based on the identified safety challenges faced by Montana's urban and rural teen-aged drivers.

During the ensuing 4-year period, the violation and accident records of the members of the two groups will be tracked and recorded. The differences between the two groups will allow us to estimate the safety benefits, if any, of the advanced handling training for novice drivers.

WTI has divided the effort into three phases: (1) Preparation for the advanced training workshops, (2) Presentation of training and assessments, and (3) Follow-on evaluation of the effects of the advanced training. Separate proposals will be submitted for each phase.

*This proposal is for Phase 3 : The follow-up data collection of longitudinal crash and violation histories of the participants.*

## Phase 1: Preparation for Advanced Training Workshops

During Phase 1, WTI worked with OPI to define and refine requirements for the defensive driving course. The course will involve multimedia classroom instruction and several hours of behind-the-wheel experience in situational awareness, decision-making, reaction to hazards, and advanced defensive vehicle handling. An important element will be risk evaluation and avoidance including responses to peer pressures.

The foundation of the curriculum is specifically designed for teen drivers utilizing the Ten Habits of the National Institute of Driver Behavior (NIDB) as a framework for model driving. As a subcontractor to WTI, Professor Fred Mottola, founder of the NIDB and designer and author of the Ten Habits, designed the curriculum. The curriculum specifically addresses the habits that are linked to the primary causes of teen crashes in Montana. Mottola has completed an analysis of teen accident conditions and causes to serve as the basis of the curriculum. The curriculum involves a pre-assessment of the teen’s skills; a behind-the-wheel instruction period in exercises specifically designed to address the targeted habits including the use of the Skid Monster; and a

post-training assessment used to prepared the tailored communication to parents and teens. Additionally, fatigue and distraction indexes with activities to measure susceptibility to each were developed and incorporated in the day's events.

The young driver course was designed for presentation to groups of 12 or fewer students to allow maximum behind-the-wheel time and interaction with instructors. A one-day (8 – 10 hour) workshop format was used. Materials for home study were provided to the students and their parents with specific suggestions for sections that should be emphasized based on the student's performance.

Novice drivers were recruited from high schools in the local Lewistown area and from high schools in Great Falls and Billings (approximately 100 miles distant) and Harlem (approximately 120 miles distant). School administrators from these areas were contacted and those interested in taking part provided mailing addresses for their recent driver education graduates.

**Phase 2: Present Advanced Driving Training to Teens.**

A workshop/training event involved an eight to ten hour day that begins at 8:00 a.m. Up to twelve students a day were trained utilizing five instructors and six training vehicles. Two sedans and one SUV were Skid Monster equipped, one with a video camera to record eye movements and other driver responses. Transportation was provided for students from Billings, Great Falls, and Harlem while students living closer to the Lewistown facility provided their own transportation. All participants were provided with a box lunch on the day of training.

Prior to the training workshops, all participants were asked to complete a questionnaire concerning their driving experience, including accidents, near accidents, and violations that have occurred in the period since receiving their driver's licenses. For students receiving training, these were completed on the morning of training. For subjects not receiving training, surveys were mailed to them and returned by mail to WTI. Students received a $20 payment for their cooperation.

In preparation for the workshops, the staff of the Montana D.R.I.V.E. facility was trained to provide the assessments and training. This instructor training involved six days of training on use of the Skid Monster and on providing classroom and in-vehicle instruction tied to the Ten Habits. The project provided for training of twelve instructors that rotated through the instruction of the 18 training sessions. The instructors were selected from the staff of driver instructors that presents adult defensive driving workshops during the summer based on their experience and skill in training younger drivers.

The workshops presented a combination of classroom and in-vehicle training. A ratio of one instructor per two students was maintained to optimize the training effectiveness. The workshops were specially tailored from the standard adult workshops to include Mottola's Ten Habits and to make optimum use of the SkidMonster equipment.

The training workshop was individually presented for each participant. At the beginning of the day, participants were tested on their driving knowledge and skills. The instructors then provided driving exercises to address any skill deficiencies demonstrated by the individuals. A multimedia classroom presentation was integrated with the driving practice. At the conclusion of

the workshop, another test explored the young drivers' new skill level. Participants received a tailored communication (report card) evaluating their driving and suggesting approaches for continued improvement. Approximately 180 participants completed the training workshops.

**Phase 3: Evaluate Effects of Advanced Training.**

The effects of the advanced training will be evaluated using both qualitative and quantitative measures. Both statistical data on the drivers' accident and violation record and interview/survey data will be collected. The data will be collected for a period of four years after the completion of the advanced training courses. At the end of each of the follow-up years, a report will be submitted providing the most current statistics and their interpretation.

Our proposed randomized sampling methodology should ensure that, on the average, the two groups represent similar socio-economic groups, safety motivation, basic psychomotor skills, and accident exposure. Therefore, differences in accident rates, accident severity, and violation rates should be attributable to the type of driver education provided.

Accident and violation records will be obtained from the Montana DOJ once each year for each of the subjects in each of the two groups. These data are available on an interactive data base for research purposes, if reported without identifying data, at a cost of $6.50 per record. Participants will also be mailed a survey form to request information about their driving records. A preliminary examination of data collected during the first year suggests that many of the participants have had minor parking lot crashes or run off road incidents that were likely not reported to police. The surveys will give us access to these minor accidents as well as injury and property damage crashes. Frequencies of minor, property damage, personal injury, and fatal accidents will be calculated for each of the two groups. Statistical analyses appropriate for frequency data (e.g., Chi-Squared analysis) will be used to explore the significance of differences between groups.

Subjects who have had accidents will be sent a questionnaire requesting additional information. The information will include detailed descriptions of the accident and data about the severity including personal injuries and property damages. Differences between the two groups in the severity of accidents will be statistically analyzed.

During the first task (2006 data analysis) participants and their parents who received the training workshops will be asked to complete a course evaluation form asking for their comments and suggestions about the course content and presentation style and how it may have affected their driving skills and habits.

Because of the importance of obtaining complete data, we propose to conduct the surveys at approximately the end of May each year. During 2006 and 2007, most of the participants will still be in high school during May and will be easier to contact. We believe that some of the most valuable data will be found during the 2006 data collection because the workshop should have the maximum benefit during the first year.

At the end of the fourth data collection period (2009), a very detailed report will be prepared to summarize the data collected, the findings, conclusions, and recommendations. In addition, summary reports required by MDT will be completed. The report will also summarize changes

in practice in young driver education during the period of the project and the interaction of driver training programs with approaches to graduated driver licensing.

If significant differences are found between the groups in accident rate and severity, calculations of the cost/benefits of the training will be calculated using standard economic models.

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# SCHEDULE AND DELIVERABLES

| | | | 2006 | | | | 2007 | | | | 2008 | | | | 2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task #** | **Task Title** | ***Milestones*** | *Q1* | *Q2* | *Q3* | *Q4* | *Q1* | *Q2* | *Q3* | *Q4* | *Q1* | *Q2* | *Q3* | *Q4* | *Q1* | *Q2* | Q3 | Q4 | Q1 |
| 1 | **Year 1 Data Collection and Report** | *Year 1 Report* | | | | | | | | | | | | | | | | | |
| 2 | **Year 2 Data Collection and Report** | *Year 2 Report* | | | | | | | | | | | | | | | | | |
| 3 | **Year 3 Data Collection and Report** | *Year 3 Report* | | | | | | | | | | | | | | | | | |
| 4 | **Year 4 Data Collection** | *Year 4 Report* | | | | | | | | | | | | | | | | | |
| 5 | **Draft Final Report** | *Draft Report* | | | | | | | | | | | | | | | | | |
| 6 | **Final Report** | *Final Report* | | | | | | | | | | | | | | | | | |

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|---|---|
| Task 1 Interim Report | Sept 30, 2006 |
| Task 2 Interim Report | Sept 30, 2007 |
| Task 3 Interim Report | Sept 30, 2008 |
| Task 4 Interim Report | June 30, 2009 |
| Draft Final Report | July 31, 2009 |
| Final Report | Sept 30, 2009 |
| Report Summary | Sept 30, 2009 |
| Quarterly Reports | July 31, 2006; 2007; 2008;2009. October 31, 2006; 2007; 2008. |

# STAFFING

***Michael Kelly*** will be the Principal Investigator. He has approximately thirty years of post-doctoral experience in managing and conducting research and development on human behavior, performance, and safety. As a Senior Research Scientist at the Western Transportation Institute, Montana State University, Dr. Kelly serves as Principal Investigator for research on human factors in transportation systems. He served as principal Investigator on Phase I and Phase II of the three phase effort to evaluate potential safety benefits of advanced defensive driving training for novice drivers. He leads the program implementing and conducting research in WTI's high-fidelity Driving Simulation Laboratory to evaluate driver performance in realistic driving scenarios. He served as Principal Investigator on a driving simulator study of driver distraction while using a cell phone to interface with the 511 travel information system. He was Task Lead for a driving simulator evaluation of the effects on driver behavior of various animal crossing warning sign configurations. He was Principal Investigator on a study of visual and visual attention deficits in older drivers and their effect on driving safety. He is Task Lead on a study of ITS approaches to reducing run-off-road collisions.

***Laura Stanley*** is a Research Associate at WTI, and a Ph.D. candidate in Industrial and Mechanical Engineering at Montana State University, with an emphasis on Transportation Safety Engineering, Human Factors, and Applied Statistics. At WTI, her focus has been on designing and conducting research in the high fidelity driving simulation laboratory. Ms. Stanley provided support in the installation and testing of the Simulation Laboratory, as well as in the administration of the first study: “Evaluation of Driver Distraction during Mobile Phone Interaction with the 511 Information System.” Currently, she is leading a project in the Simulator to study advanced in-vehicle run-off-road warning techniques She recently completed an evaluation of the effectiveness of animal crossing signs on driver behavior. She supported data collection on “Effects of Defensive Vehicle Handling Training on Novice Driver Safety”.

# FACILITIES

The Western Transportation Institute is located in the College of Engineering at Montana State University – Bozeman. WTI has a 55 person multidisciplinary research staff of professionals, students, and associated faculty from engineering (mechanical/industrial/civil), computer science, psychology, fish and wildlife, business, biology and economics.

WTI has recently moved into a dedicated transportation research facility with more than 20,000 square feet of space for its core research and administrative staff. This includes 14,000 square feet of offices and 6000 square feet of dedicated space for on-site research laboratories. These research laboratories are equipped to focus on emerging needs in rural transportation, as well as capitalize on the technical expertise of in-house investigators:

- **Driving Simulation Laboratory**: WTI's Human Factors Group is supported by a state-of-the-art driving simulation laboratory. This high-fidelity facility allows testing of driver performance and behavior in a variety of customized scenarios. The DriveSafety DS500C Vection simulator features five visual channels providing approximately 140-degrees of view, plus rear-view and side mirrors, as well as speakers that provide a realistic sound environment. WTI's new building contains accommodations to support an additional proposed simulator.
- **Materials Corrosion Laboratory**: This facility allows WTI to evaluate the corrosion rate of transportation construction and maintenance materials, and the performance of corrosion inhibitors. The Laboratory is also capable of investigating corrosion issues related to "cold region" highway maintenance and infrastructure management.
- **Transportation, Research**, **Applications and Integration Laboratory (TRAIL)**: The TRAIL laboratory is a simulated small urban/rural traffic management center that enables comprehensive research for ITS technologies being used in the transportation field. The TRAIL lab serves as a test bed for ITS technologies and related issues such as TMS to TMC communications, traffic management, traveler information and incident response.
- **Systems Engineering and Integration Laboratory**: The goal of this facility is to utilize multi-discipline education and research to develop integrated skills and systems that produce best management solutions in a small urban and rural environment. The laboratory will be equipped to facilitate both electronics testing and software development, with enough space for assembly and testing of prototype systems on the scale of highway message signs.
- **Materials Laboratory:** The Materials Laboratory allows WTI to develop longer lasting, more cost effective designs for various highway infrastructure such as pavements and bridges. WTI's facility specializes in testing the performance of geosynthetic materials, and is equipped with a servo-hydraulic load frame, a servo-hydraulic retrofit system for an existing pullout box, and a biaxial tension apparatus.

As a university entity, WTI benefits from general Montana State University facilities and services, such as computer laboratories and technical assistance, more general engineering laboratories, GIS and mapping services, printing services, and contracting and other financial support.

# PROJECT BUDGET

## Federal Fiscal Years

| | 5/1/06 to 9/30/06 | | 10/01/06 to 9/30/07 | | 10/1/07 to 9/30/08 | | 10/1/08 to 9/30/09 | | 10/1/09 - 12/31/09 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **FY-06** | | **FY-07** | | **FY-08** | | **FY-09** | | **FY-10** | | **Budget Totals** | | **Project Total** |
| | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | |
| **Labor** | $ 24,000.00 | | $ 12,685.00 | $ 8,000.00 | $ - | $ 20,600.00 | $ 9,043.00 | $ 12,000.00 | $ 8,000.00 | $ 591.00 | $ 53,728.00 | $ 41,191.00 | $ 94,919.00 |
| **Travel** | $ 200.00 | | $ 100.00 | $ - | $ - | $ 100.00 | $ 150.00 | $ - | $ 150.00 | $ - | $ 600.00 | $ 100.00 | $ 700.00 |
| **Ops/Comm,** | $ 3,475.00 | | $ 3,495.00 | $ - | $ - | $ 3,515.00 | $ 3,535.00 | $ - | $ - | $ - | $ 10,505.00 | $ 3,515.00 | $ 14,020.00 |
| **Participant Support** | $ 7,200.00 | | $ - | $ 7,200.00 | $ - | $ 7,200.00 | $ - | $ 7,200.00 | $ - | $ - | $ 7,200.00 | $ 21,600.00 | $ 28,800.00 |
| **Total Direct Costs** | $ 34,875.00 | | $ 16,280.00 | $ 15,200.00 | $ - | $ 31,415.00 | $ 12,728.00 | $ 19,200.00 | $ 8,150.00 | $ 591.00 | $ 72,033.00 | $ 66,406.00 | $138,439.00 |
| **Overhead** | $ 5,535.00 | | $ 3,256.00 | $ 3,320.00 | $ - | $ 10,049.00 | $ 2,546.00 | $ 4,980.00 | $ 1,630.00 | $ 245.00 | $ 12,967.00 | $ 18,594.00 | $ 31,561.00 |
| **Total Project Cost** | $ 40,410.00 | | $ 19,536.00 | $ 18,520.00 | $ - | $ 41,464.00 | $ 15,274.00 | $ 24,180.00 | $ 9,780.00 | $ 836.00 | **$ 85,000.00** | **$ 85,000.00** | **$170,000.00** |

## State Fiscal Years

| | 5/1/06 to 6/30/06 | | 7/1/06 to 6/30/07 | | 7/01/07 to 6/30/08 | | 7/01/08 to 6/30/09 | | 7/01/09 to 12/30/09 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **FY-06** | | **FY-07** | | **FY-08** | | **FY-09** | | **FY-10** | | **Budget Totals** | | **Project Total** |
| | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | **MDT $** | **WTI $** | |
| **Labor** | $ 13,000.00 | | $ 16,300.00 | $ 8,000.00 | $ 3,700.00 | $ 20,600.00 | $ 12,300.00 | $ 12,000.00 | $ 8,428.00 | $ 591.00 | $ 53,728.00 | $ 41,191.00 | $ 94,919.00 |
| **Travel** | $ 125.00 | | $ 125.00 | $ - | $ 50.00 | $ 100.00 | $ 125.00 | $ - | $ 175.00 | $ - | $ 600.00 | $ 100.00 | $ 700.00 |
| **Ops/Comm,** | $ 3,475.00 | | $ 3,495.00 | $ - | $ - | $ 3,515.00 | $ 3,535.00 | $ - | $ - | $ - | $ 10,505.00 | $ 3,515.00 | $ 14,020.00 |
| **Participant Support** | $ 7,200.00 | | $ - | $ 7,200.00 | $ - | $ 7,200.00 | $ - | $ 7,200.00 | $ - | $ - | $ 7,200.00 | $ 21,600.00 | $ 28,800.00 |
| **Total Direct Costs** | $ 23,800.00 | | $ 19,920.00 | $ 15,200.00 | $ 3,750.00 | $ 31,415.00 | $ 15,960.00 | $ 19,200.00 | $ 8,603.00 | $ 591.00 | $ 72,033.00 | $ 66,406.00 | $138,439.00 |
| **Overhead** | $ 3,320.00 | | $ 3,984.00 | $ 3,320.00 | $ 750.00 | $ 10,049.00 | $ 3,192.00 | $ 4,980.00 | $ 1,721.00 | $ 245.00 | $ 12,967.00 | $ 18,594.00 | $ 31,561.00 |
| **Total Project Cost** | $ 27,120.00 | | $ 23,904.00 | $ 18,520.00 | $ 4,500.00 | $ 41,464.00 | $ 19,152.00 | $ 24,180.00 | $ 10,324.00 | $ 836.00 | **$ 85,000.00** | **$ 85,000.00** | **$170,000.00** |

**Labor Hours**

| | Task 1 | Task 2 | Task 3 | Task 4 | Task 5&5 | Total |
|---|---|---|---|---|---|---|
| M. J. Kelly, P.I. | 160 | 120 | 120 | 120 | 80 | 600 |
| Research Scientist 1 | 240 | 240 | 240 | 240 | 140 | 1100 |
| Undergraduate | 160 | 100 | 100 | 100 | 0 | 460 |
| Support Staff | 16 | 16 | 16 | 16 | 40 | 104 |

M.J. Kelly will serve as Principal Investigator responsible for design of data collection procedures, report writing, management, and interactions with MDT.

The Research Scientist I will conduct data collection and analysis under the direction of the Principal Investigator.

The Undergraduate Student will maintain mailing lists, address and assemble mailings, and enter and reduce incoming data.

The support staff will maintain financial records and edit project reports.

**Travel** costs include in-state travel between Bozeman and Helena for progress meetings and status briefings. Single day travel by automobile is planned. Depending on mode of travel (rental car, motorpool car, or private car) transportation cost may vary between $40 and $80 per trip. We have assumed that travel will cost $50 per trip.

**Ops/Com** costs include copying and materials for surveys and reports. It includes postage for survey mailing. It also includes purchase of participant driving records from DOJ at $6.50 per record.

**Participant Support** includes a $20/year payment to participants to complete and return project surveys.